

Alg. 2 Warm Up # 4-1

Find the pattern and state whether it is a Common Difference or a Common Multiplier, then find the next two numbers in the sequence.

1) 13, 8, 3, - 2, ... 2) 3, 12, 48, ...

3) A sequence always starts with term #1.

Find the "zero term" for each sequence above.

HW Questions:

10) $y = \frac{3}{5}x - 2$

$$10\left(\frac{3}{5}x - 2\right) = \left(\frac{x}{10} + 1\right)10$$

$y = \frac{x}{10} + 1$

$$6x - 20 = x + 10$$

$$5x = 30$$

$$x = 6$$

$$y = \frac{6}{10} + \frac{10}{10}$$

$$y = \frac{16}{10}$$

$$y = \frac{8}{5}$$

$$\left(6, \frac{8}{5}\right)$$

$$2) \quad x = -0.5y + 4$$

$$8x + 3y = 31$$

$$8(-0.5y + 4) + 3y = 31$$

$$-4y + \frac{32}{-32} + 3y = \frac{31}{-32}$$

$$-y = -1$$

$$y = 1$$

$$a) \quad 2x + y = 7$$

$$x + 5y = 12 \rightarrow x = \frac{12 - 5y}{-5y}$$

$$x + 5\left(\frac{17}{9}\right) = 12$$

$$x + \frac{85}{9} = 12$$

$$x = \frac{12}{1} \cdot \frac{9}{9} - \frac{85}{9}$$

$$x = \frac{108}{9} - \frac{85}{9}$$

$$x = \frac{23}{9}$$

$$2(12 - 5y) + y = 7$$

$$\frac{24}{-24} - 10y + y = \frac{7}{-24}$$

$$\frac{-9y}{-9} = \frac{-17}{-9}$$

$$y = \frac{17}{9}$$

$$\left(\frac{23}{9}, \frac{17}{9}\right)$$

Sequence Review:

| x | 1 | 2 | 3 | 4 |
|-----|----|----|---|--------|
| y | -4 | -1 | 2 | 5, ... |

\swarrow \searrow
 -3 $+3$ $+3$

Equation:

"zero term" = -7

$$y = 3x - 7$$

$$t(n) = 3n - 7$$

| n | 1 |
|--------|---|
| $t(n)$ | |

① Look for a pattern

② Go backwards to find the zero term.

③ Write the equation

Arithmetic or Geometric?

④ Test it:

| | |
|--------|----|
| n | 2 |
| $t(n)$ | -1 |

$$-1 \stackrel{?}{=} 3(2) - 7$$

$$-1 = 6 - 7$$

$$-1 = -1 \quad \checkmark$$

Sequence Notes:

Let n = the term number (Notice: n is an integer ≥ 1) $t(n)$ = the n^{th} term in the sequence

Example: 13, 8, 3, -2, ...

The first term is 13, so when $n = 1$, $t(n) = 13$

$$\text{or } t(1) = 13$$

Make a table:

| n | 1 | 2 | 3 | 4 |
|--------|----|---|---|----|
| $t(n)$ | 13 | 8 | 3 | -2 |

\swarrow \searrow \swarrow \searrow
 -5 -5 -5

Arithmetic Sequences

Common Difference: A number being added or subtracted each time to get the next number in the sequence. This is the growth or slope.

The relationship is **Linear**.

Finding the "**Zero Term**", go backwards from the first term.

Equation Model: $t(n) = (\text{Common Difference})n + (\text{"Zero Term"})$

$$y = mx + b$$

slope ↑
y-int.

Equation Writing Process:

- * Find the pattern. -5
Common difference
Arithmetic

| n | 0 | 1 | 2 | 3 | 4 |
|------|----|----|---|---|----|
| t(n) | 18 | 13 | 8 | 3 | -2 |

$+5$ -5 -5 -5

- * Find the "zero term". $= 18$
go backwards

- * Write the equation.

$$t(n) = (\text{common diff})n + \text{zero term.} \rightarrow t(n) = -5n + 18$$

- * Test it. \rightarrow

$(2, 8) \rightarrow 8 \stackrel{?}{=} -5(2) + 18$
 $\quad \quad \quad \quad \quad \quad \quad \quad -10 + 18$
 $\quad \quad \quad \quad \quad \quad \quad \quad 8 = 8 \checkmark$

\nearrow n \nwarrow $t(n)$

Geometric Sequences

Common Multiplier: A number being multiplied each time to get the next number in the sequence. This is the growth factor.

The relationship is **Exponential**.

Finding the "**Zero Term**": go backwards from the first term.

Equation Model: $t(n) = (\text{"Zero Term"}) (\text{Common Multiplier})^n$

looks like $y = ab^x$

initial value y-int. \rightarrow a

\rightarrow b **Common Multiplier**

Equation Writing Process:

- * Find the pattern. $\times 4$

Geometric

- * Find the "zero term". $\frac{3}{4}$

- * Write the equation.
 $t(n) = \frac{3}{4}(4)^n$

- * Test it. $(2, 12) \rightarrow$

| n | 0 | 1 | 2 | 3 |
|------|---------------|---|----|----|
| t(n) | $\frac{3}{4}$ | 3 | 12 | 48 |

$\times \frac{1}{4}$ (from 3 to $\frac{3}{4}$)

$\times 4$ (from $\frac{3}{4}$ to 3)

$\times 4$ (from 3 to 12)

$\times 4$ (from 12 to 48)

$$12 \stackrel{?}{=} \frac{3}{4}(4)^2$$

$$12 = \frac{3}{4}(16)4$$

$$12 = 12 \checkmark$$

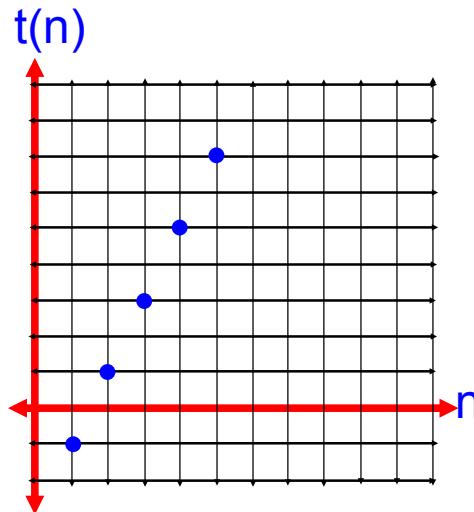
From a graph:

Make a table first.

| | | | | |
|--------|---|----|---|---|
| n | 0 | 1 | 2 | 3 |
| $t(n)$ | 3 | -1 | 1 | 3 |

\swarrow \searrow
 -2 $+2$

$$t(n) = 2n - 3$$



Discrete

Quick Graphs (Review for Quiz Wed)

from: $y = mx + b$

\nearrow slope.
 \nwarrow y-int.

① Plot y-int
 ② Count slope to get 2nd pt.

$$Ax + By = C$$

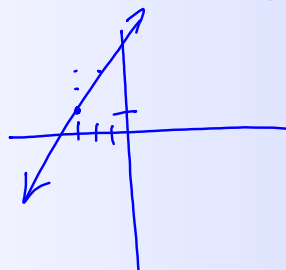
Standard Form A, B, C are Integers
 $A > 0$ find x & y intercepts.

$$y - y_1 = m(x - x_1)$$

\nearrow slope
 a point on the line
 (x_1, y_1)

$$y - 1 = 2(x + 3)$$

$$m = 2 \quad (-3, 1)$$



HW: Sequence worksheet #1
(blue)